

# LOAN DOCUMENT

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<p><i>Arm Effort for the Bioventing Sys...</i></p> <p>DOCUMENT IDENTIFICATION <i>25 Aug 92</i></p>																													
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="padding: 2px;">ACCESSION FOR</td> </tr> <tr> <td style="padding: 2px;">NTIS</td> <td style="padding: 2px;">GRAB <input checked="" type="checkbox"/></td> </tr> <tr> <td style="padding: 2px;">DTIC</td> <td style="padding: 2px;">TRAC <input type="checkbox"/></td> </tr> <tr> <td colspan="2" style="padding: 2px;">UNANNOUNCED JUSTIFICATION</td> </tr> <tr><td colspan="2" style="height: 15px;"></td></tr> <tr><td colspan="2" style="height: 15px;"></td></tr> <tr><td colspan="2" style="height: 15px;"></td></tr> <tr><td colspan="2" style="height: 15px;"></td></tr> <tr> <td colspan="2" style="padding: 2px;">BY</td> </tr> <tr> <td colspan="2" style="padding: 2px;">DISTRIBUTION/</td> </tr> <tr> <td colspan="2" style="padding: 2px;">AVAILABILITY CODES</td> </tr> <tr> <td style="padding: 2px;">DISTRIBUTION</td> <td style="padding: 2px;">AVAILABILITY AND/OR SPECIAL</td> </tr> <tr> <td style="height: 60px; vertical-align: middle; text-align: center; font-size: 2em;">A-1</td> <td></td> </tr> </table>		ACCESSION FOR		NTIS	GRAB <input checked="" type="checkbox"/>	DTIC	TRAC <input type="checkbox"/>	UNANNOUNCED JUSTIFICATION										BY		DISTRIBUTION/		AVAILABILITY CODES		DISTRIBUTION	AVAILABILITY AND/OR SPECIAL	A-1		<div style="border: 1px solid black; width: 100%; height: 150px; margin-bottom: 10px;"></div> <p style="text-align: center;">DATE ACCESSIONED</p> <div style="border: 1px solid black; width: 100%; height: 100px; margin-bottom: 10px;"></div> <p style="text-align: center;">DATE RETURNED</p> <div style="border: 1px solid black; width: 100%; height: 100px;"></div> <p style="text-align: center;">REGISTERED OR CERTIFIED NUMBER</p>	
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HANDLE WITH CARE

August 25, 1992

Mr. Jim Williams, P.G., C.G.W.P.  
Department of the Air Force  
Center for Environmental Excellence  
Environmental Restoration Division (ESR)  
Building 624 West  
Brooks AFB, Texas 78235-5000

Subject: F33615-90-4014, Order 04,  
O&M Effort for the Bioventing System at the 7th Street BX Service Station  
(May through August 1992), Eglin, AFB

Dear Mr. Williams:

This letter presents the results of the monitoring effort for the Bioventing System at the 7th Street BX Service Station. A summary of operation and maintenance efforts performed since system startup through August 21 is also included.

If you have any questions please call me.

Sincerely,

ENGINEERING-SCIENCE, INC.



Ola A. Awosika, P.G.  
Project Manager

OAA:jw  
Attachment

cc/enc Ms. Patricia Williamson  
Doug Downey  
Major Miller c/o J. Williams

AQ101-04-0631

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## **O&M EFFORT FOR THE BIOVENTING SYSTEM AT THE 7TH STREET BX SERVICE STATION (MAY THROUGH AUGUST 1992), EGLIN, AFB**

### **OPERATION AND MAINTENANCE**

Operation and maintenance for the first quarter since installation has included a check on each of the bioventing system components (i.e., blower, gauges, air filter, vapor extraction wells, and injection trenches) to evaluate operating status and to make adjustment where appropriate or necessary.

Over the period May 20 through July 22, 1992 no significant adjustment was made to the system other than increasing the air dilution rate at the air dilution valve on the intake to the blower unit. This adjustment was made to reduce off gas concentration at the injection trenches and to minimize emission of gases into the atmosphere. Prior to making this adjustment a pressure relief valve was installed downstream of the blower. The air filter has been changed twice to maximize air flow from the air intake line to the blower and to ensure removal of fugitive materials.

Because of continued reports of strong gasoline odor at the gasoline station, a decision was made to replace the existing 2 horse power (hp) blower unit being used with a 1 hp unit. On August 3, 1992, the 2 hp blower was replaced with a 1 hp blower. A recent visit to the site on August 20 revealed the blower has not been operating continuously because of power failures associated with frequent storms in the area. A decision was made to rewire the starter for the blower to allow continued operation once power is restored after a storm event. Rewiring of the starter will be completed the week ending August 28.

An in-situ respiration test was scheduled for August 27 and 28; however, this has been temporarily postponed due to Hurricane Andrew. The respiration test will be performed to ensure that nutrients, moisture, or oxygen are not limiting biodegradation. The respiration test will include oxygen and carbon dioxide monitoring over a 40 to 60 hour period as described in the work plan for this project. In addition, vacuum monitoring may be performed at Vapor Monitoring Points (VMPs) to assure system operation is within range of design specification. Off gas emission in the vicinity of the injection trenches will be closely monitored during this visit to ensure concentrations of gases in the breathing zone are at acceptable levels.

### **ANALYTICAL RESULTS**

Results of biweekly/monthly check of oxygen, carbon dioxide and Total Hydrocarbons in the off gas from the bioventing system are presented in Table 1. These results continued to indicate increased biological activity in the subsurface and suggest potential increase in aerobic bacterial population. Specifically oxygen supply to the subsurface has been adequately sustained. Notably, pre-venting condition indicated soil oxygen concentration of zero at VMP-1 and VMP-2. By July 22, oxygen concentrations at all monitoring locations have increased to values ranging from 9.8 to 20.0 percent. In contrast, carbon dioxide which was in excess of 15 percent prior to startup has declined to values ranging from 1.4 to 8.1 percent at all monitoring points.

**TABLE 1**  
**RESULTS OF SOIL GAS ANALYSES**  
**DURING BIOVENTING (5/20/92 - 7/22/92)**  
**AT 7TH STREET BX SERVICE STATION**  
**EGLIN AFB**

Location	Baseline(1)			1st Week(2)			3rd Week		
	TH	O <sub>2</sub>	CO <sub>2</sub>	TH	O <sub>2</sub>	CO <sub>2</sub>	TH	O <sub>2</sub>	CO <sub>2</sub>
	ppmv	%	%	ppmv	%	%	ppmv	%	%
Air Discharge to Injection Trench	-	0.0%	> 15.0%	12,000	20.0%	0.6%	5,800	20.3%	0.7%
Inflow into Blower	90,000	0.0%	> 15.0%	-	-	-	-	-	-
VMP-1D	-	0.0%	> 15.0%	-	-	-	680	0.7%	12.1%
VMP-2D	-	0.0%	> 15.0%	-	-	-	> 20,000	17.6%	1.8%
MW10	-	0.0%	> 15.0%	-	-	-	320	20.5%	0.5%

(1) - Baseline background conditions were: Oxygen - 20.4%, Carbon Dioxide - 0.6%.

(2) - Week since start-up of system operation

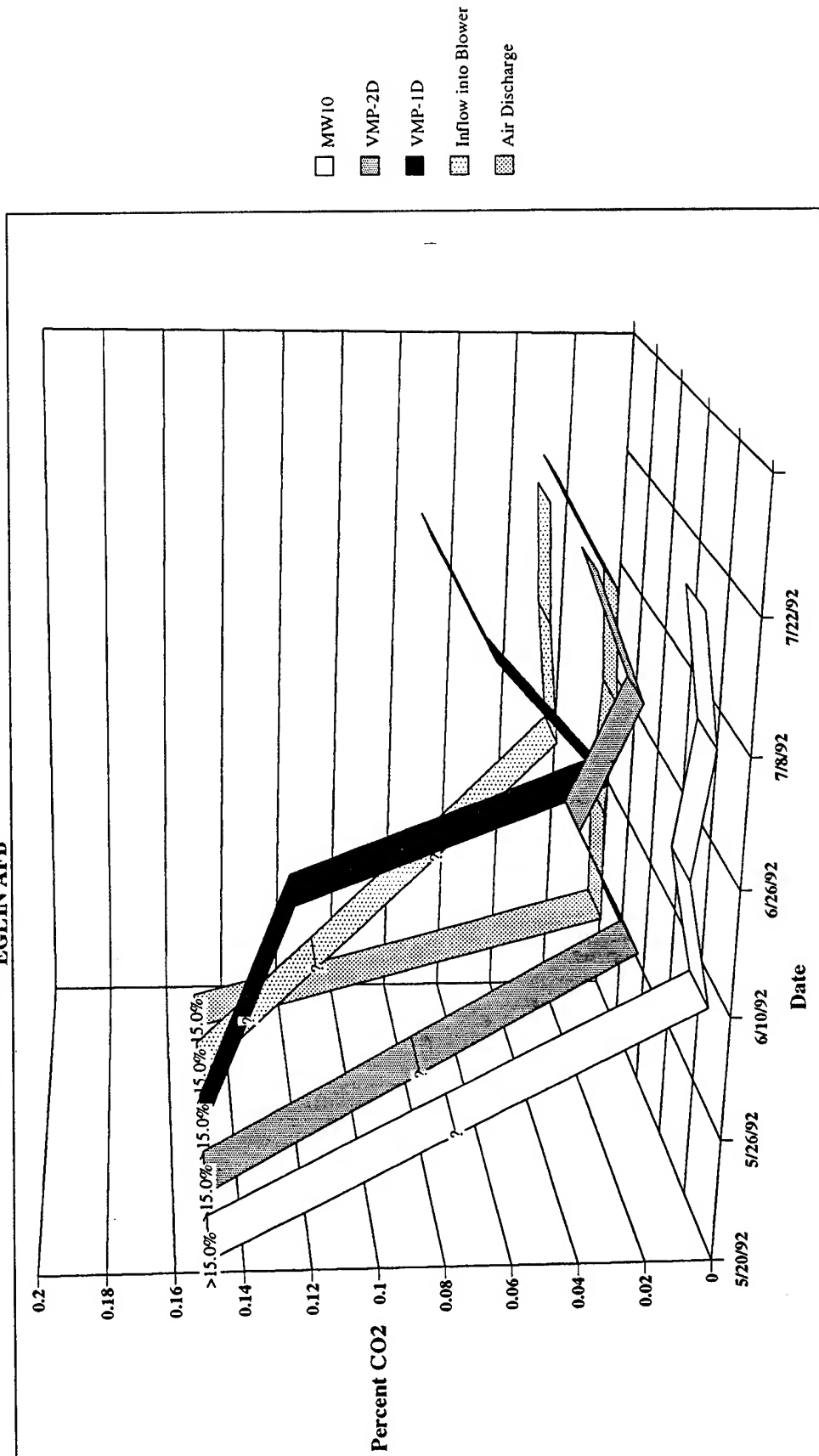
TH - Total Hydrocarbons

**TABLE 1 - Continued**  
**RESULTS OF SOIL GAS ANALYSES**  
**DURING BIOVENTING (5/20/92 - 7/22/92)**  
**AT 7TH STREET BX SERVICE STATION**  
**EGLIN AFB**

Location	5th Week 6/26/92			7th Week 7/8/92			9th Week 7/22/92		
	TH ppmv	O2 %	CO2 %	TH ppmv	O2 %	CO2 %	TH ppmv	O2 %	CO2 %
Air Discharge to Injection Trench	2,400	20.6%	0.5%	3,000	20.1%	0.7%	720	20.0%	3.0%
Inflow into Blower	15,600	17.1%	3.2%	14,200	17.1%	3.6%	10,800	16.3%	3.8%
VMP-1D	220	18.7%	2.2%	396	13.2%	5.9%	540	9.8%	8.1%
VMP-2D	> 20,000	15.0%	3.8%	> 20,000	17.6%	2.1%	> 20,000	14.0%	3.7%
MW10	18,800	19.5%	1.3%	10,000	19.8%	0.8%	8,600	19.4%	1.4%

TH - Total Hydrocarbons

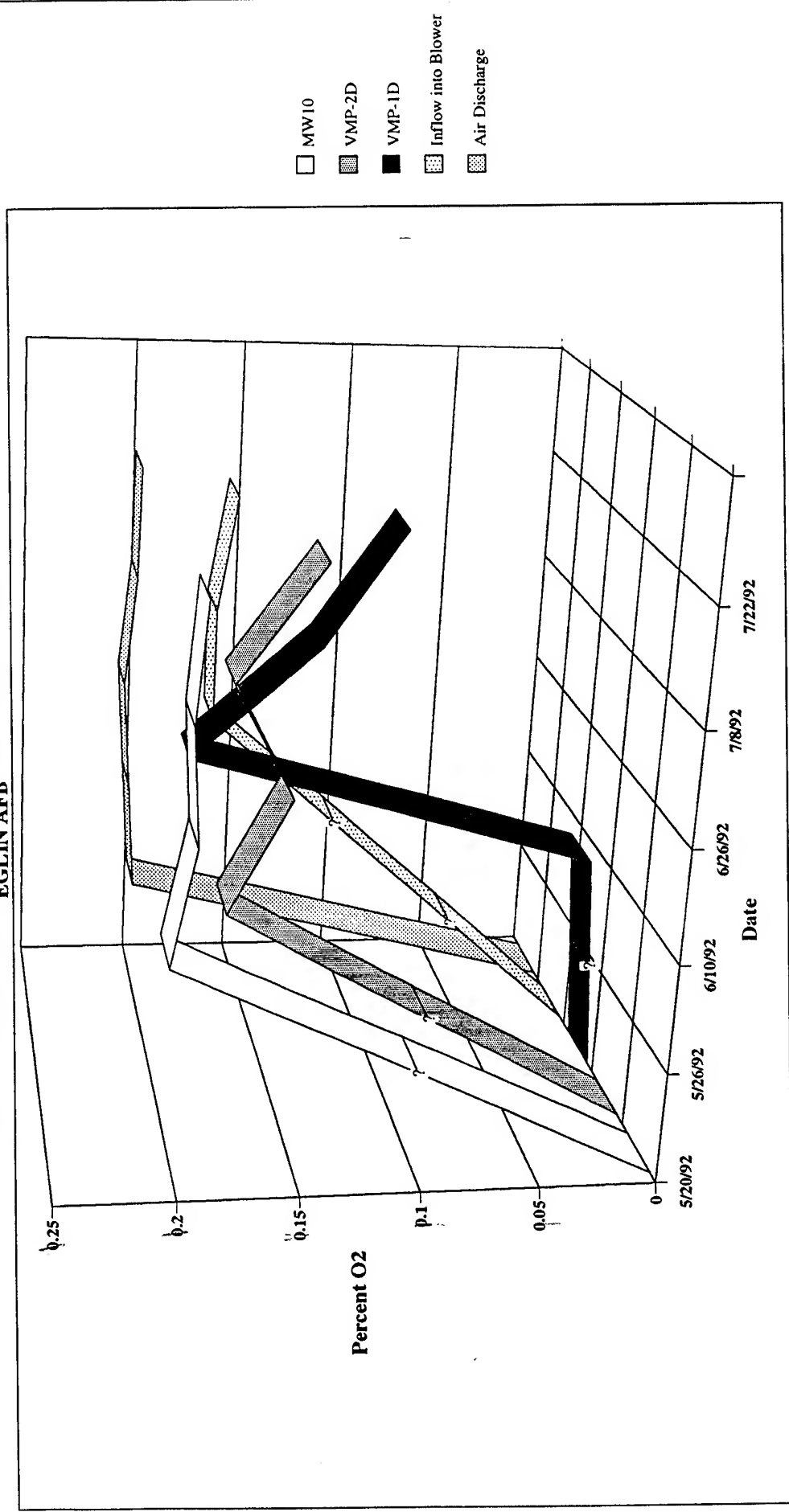
**CARBON DIOXIDE LEVELS DURING BIOVENTING  
AT 7TH STREET BX SERVICE STATION (5/20/92 - 7/8/92)  
EGLIN AFB**



Note: "?" indicates no data was recorded on this date; slopes are assumed to be linear.

Figure 2

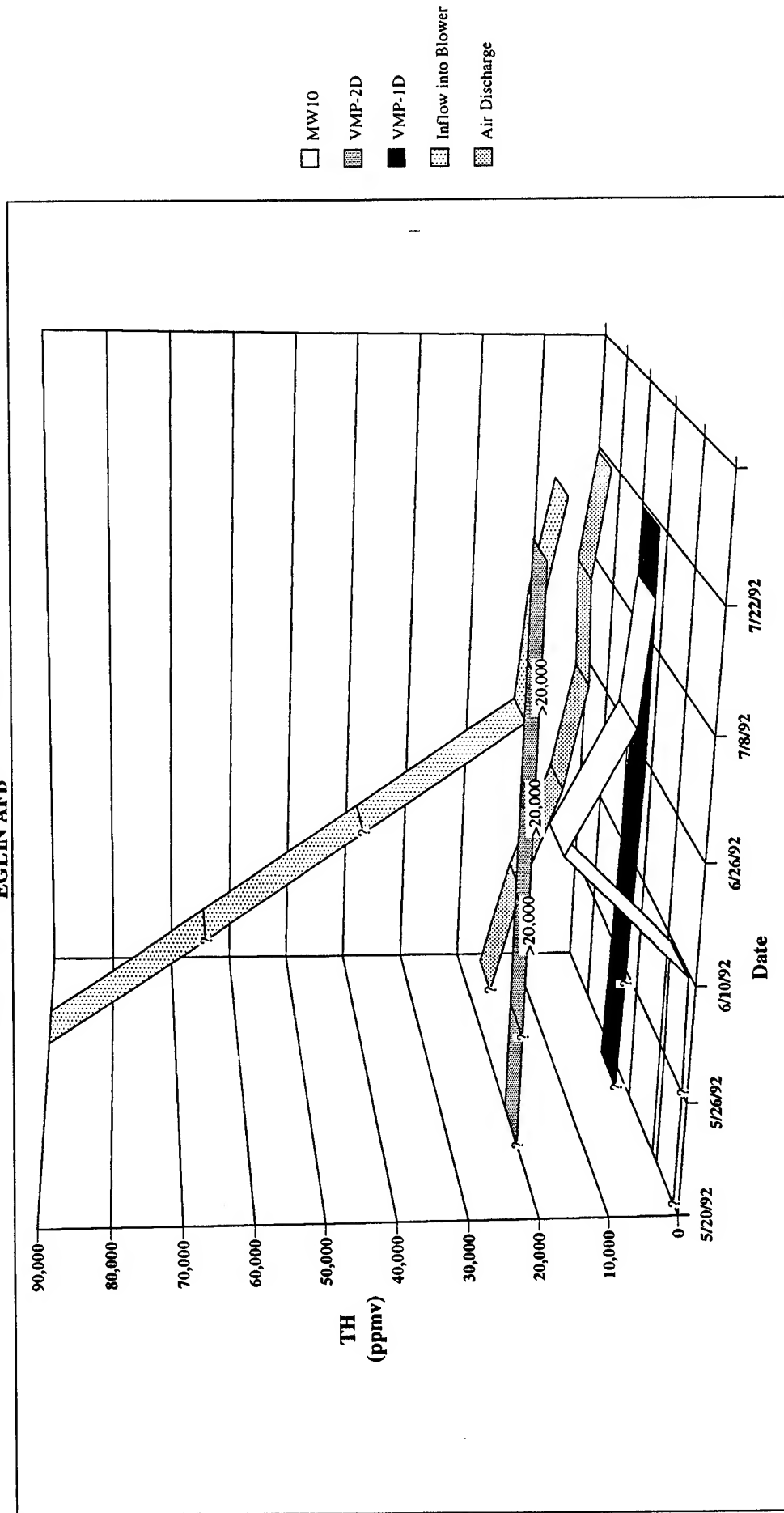
**OXYGEN LEVELS DURING BIOVENTING  
AT 7TH STREET BX SERVICE STATION (5/20/92 - 7/8/92)  
EGLIN AFB**



Note: "?" indicates no data was recorded on this date; slopes are assumed to be linear.



**TOTAL HYDROCARBON LEVELS DURING BIOVENTING  
AT 7TH STREET BX SERVICE STATION (5/20/92 - 7/8/92)  
EGLIN AFB**



Note: "?" indicates no data was recorded on this date; slopes are assumed to be linear.